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ABSTRACTS

Alphabetized by first author's last name.

SANIDAD DE SEMILLAS DE FRIJOL (*Phaseolus vulgaris* L.) PROVENIENTES DE 11 ZONAS PRODUCTORAS DE COSTA RICA. C. Araya y Mora, E. Escuela de Ciencias Agrarias, Universidad. Ap. 86-3000. Heredia. Costa Rica.

Se recolectaron muestras de frijol comercial de grano rojo o negro en once localidades productoras de Costa Rica. Se determinó la calidad y la sanidad de las semillas. Esta última se evaluó por el método de papel filtro con 2,4D, después de siete días de incubación a 26°C y períodos alternos de luz y oscuridad. Los hongos más frecuentes fueron: *Aspergillus* spp. (78.5%), *Penicillium* sp. (69.0%), *Fusarium* spp. (65.5%), *Cercospora* sp. (62.0%), *Botryodiplodia* sp. (29.5%), *Rhizoctonia solani* (23.0%), *Cladosporium* (23.0%), *Macrophomina phaseolina* (18.0%); y otros hongos en menos de 10% infección total. En general las variedades de grano negro presentaron menor porcentaje de infección. En cuanto a localidades, las muestras provenientes de zonas de influencia Atlántica, fueron las que presentaron mayor complejidad en la población de patógenos. Los patógenos más importantes se presentaron en muestras provenientes de Atenas, Palmares, Puriscal, Turrúcares, Los Chiles y La Fortuna.

DIFFERENTIAL DETECTION OF WHITEFLY-TRANSMITTED GEMINIVIRUSES IN WEED SPECIES FROM PUERTO RICO BY HYBRIDIZATION ANALYSIS WITH NON-RADIOACTIVE DNA PROBES. J.K. Brown, B.P. Poulos and J. Bird. Dept. of Plant Pathology, Univ. of Arizona, Tucson AZ 85721. Crop Prot. Dept., Ag. Exp. Stn., P.O. Box 21360; Univ. of Puerto Rico, Rio Piedras, PR 00928.

Weed species from Puerto Rico were analyzed for whitefly-transmitted (WFT) geminiviruses by hybridization with non-radioactive DNA probes of cloned WFT geminiviruses. Plant sap was denatured, neutralized, and applied as dots (3ul) to nylon membranes. Clones were sulfonated, and hybridization was carried out at 42°C. Results were determined visually, based on the intensity of insoluble reaction products relative to internal controls. Positive reactions were observed with *Euphorbia heterophylla* using A-component probes to squash leaf curl, bean golden mosaic and tomato golden mosaic (TGMV) viruses. *Malvastrum coromandelianum* and *Sida acuta* samples reacted only to the TGMV probe. The chino del tomate virus probe hybridized to *M. coromandelianum*, *S. acuta*, and *Triumfetta semitriloba* samples. No reaction was observed in any species using African cassava mosaic virus probes. WFT geminiviruses were not detected in *Boerhavia coccinea* or *Macroptilium lathyroides*.

EVALUATION OF SOIL AMENDMENTS FOR CONTROL OF *SCLEROTIUM ROLFSSII*. Graciela Canullo and R. Rodriguez-Kabana, Department of Plant Pathology, Auburn University, Auburn, Alabama 36849.

Three amine compounds were selected from preliminary screenings as soil amendments for control of *Sclerotium rolfsii*. The amendments were evaluated under greenhouse conditions at dosages of 0.05, 0.1, 0.2, 0.3, 0.4, and 0.5 g/kg of soil using lentil (*Lens culinaris*) as a host plant. Increasing dosages of the amendments improved emergence and seedling survival, but induced phytotoxicity at rates >0.3 g/kg of soil. Pathogen growth and survival was effectively reduced at dosages of 0.2-0.3 g/kg soil. Soil urease activity increased in response to the application of two of the amendments. *In vitro* testing for direct toxicity of the compounds on the pathogen revealed that the compounds reduced mycelial radial growth, but were not fungicidal.

ISOLATION AND CHARACTERIZATION OF DNA CLONES SPECIFIC FOR RACE 3 OF *PSEUDOMONAS SOLANACEARUM*. Douglas Cook and Luis Sequeira, University of Wisconsin-Madison, Department of Plant Pathology, Madison, WI 53706.

The use of DNA probes to assess restriction fragment length polymorphisms (RFLP) within *Pseudomonas solanacearum* has provided new insight into the taxonomic and evolutionary relationships among members of this species. Results suggest that geographical isolation played a significant role in the evolution of the species. For example, the narrow host range race 3 which probably originated in the Andean region of South America has the unique ability to cause disease on potatoes in cool climates. By subtractive DNA hybridization, we have isolated a DNA clone with homology to race 3 strains, but not to other members of the species. Subsequent analysis has revealed that this race specific region includes at least 21kb of DNA. Biotinylated preparations of this probe are potentially useful as a simple and rapid means for identifying race 3 strains.

EFFECT OF CALCIUM SILICATE SLAG AND FUNGICIDES ON BROWN SPOT DEVELOPMENT, YIELD, AND YIELD COMPONENTS OF RICE. L. E. Datnoff, G. H. Snyder, and D. B. Jones. University of Florida-EREC, P. O. Box 8003, Belle Glade, FL 33430-8003.

Severity of brown spot of rice, caused by *Bipolaris oryzae*, is usually intense on Histosol-grown rice in Florida. Development of brown spot and the effects on yield and yield components of rice were studied in a 2 X 4 factorial experiment that included six replications. Factors were plots treated alone or in combination with calcium silicate slag (slag) at 10 Mg/ha, Benlate at 1.68 kg/ha, and Tilt at 0.44 L/ha. There was a significant (P<0.05) slag*fungicide interaction for area under disease progress curve (AUDPC), grain number per panicle, and seed weight. Nontreated plots exhibited yield reductions of 16%, 39.3%, and 43.8% when compared to plots treated with Tilt alone, slag alone or a combination of Tilt and slag, respectively. Results indicate Tilt alone reduced AUDPC and increased yield and yield components over the nontreated control. However, effects due to slag alone were much greater, providing a potential nonchemical control method for managing this disease.

Camera-ready abstracts are published as they were submitted by the Division. The abstracts are not edited or typed in the APS headquarters office.

SEPARATION OF DNA OF PLANT PATHOGENIC MYCOPLASMA-LIKE ORGANISMS (MLO) BY FIELD-INVERSION GEL ELECTROPHORESIS. Michael J. Davis and Meghnad Konai. University of Florida, IFAS, 18905 SW 280 Street, Homestead, FL 33031

The maize bushy stunt (MBS) MLO and *Spiroplasma kunkelii* were extracted from doubly infected corn, resuspended (1:3 w/v) in STE (10 mM Tris, 0.5 M EDTA, 100 mM NaCl, pH 7.6) containing 2 mg/ml proteinase K, incubated for 2 hr at 37 C, and embedded (1:1 v/v) in 1.5% Seaplaque agarose. The resulting agarose plugs were incubated (1:1 v/v) in NDS (10 mM Tris, 0.5 M EDTA, 1% lauroyl sarcosine, pH 9.5) containing 2 mg/ml proteinase K for 48 hr at 42 C, incubated in NDS (replaced daily) for 48-72 hr at 4 C, and stored in TE. DNA contained in plugs was separated on a 14-cm horizontal 1% agarose gel in 0.5x TBE at ca 14 C for 21 hr at 6 V/cm using a linear time ramp with an initial forward interval of 2.5 sec and a forward to reverse field ratio of 5:2. One band (ca. 1500 kb) corresponded in size to DNA of *S. kunkelii* from pure culture; the other band (ca. 665 kb) was identified as MBS-MLO DNA by Southern analysis using a cloned DNA probe for the MLO and may be the entire MLO chromosome.

DETECTION OF TOMATO SPOTTED WILT VIRUS IN ORNAMENTAL AND VEGETABLE CROPS. V. DeHerrera, R.F. Davis and L.A. Gonzales. Agdia, Inc., 30380 County Road 6, Elkhart, Indiana 46514, USA.

Tomato Spotted Wilt Virus (TSWV) causes a variety of symptoms, from mild ringspots to lethal necrosis, within a wide range of ornamental and vegetable crops. At our laboratory, two antisera, based on Impatiens (TSWV-I) and lettuce (TSWV-L) isolates are being utilized in DAS-ELISA to detect TSWV in economically important ornamental and vegetable crops. Our data show that TSWV-I is more likely to be detected in ornamentals, and TSWV-L in vegetables. However, neither isolate is exclusive to ornamentals or vegetables, and both antisera should be used for screening and diagnosis.

PRODUCTIVIDAD DE NUEVAS VARIEDADES DE CAÑA DE AZUCAR EN EL VALLE DE LAJAS Y SU RESISTENCIA AL CARBÓN Y A LA ROYA. R. Echázvez-Badel J.L. Rodríguez y C. Almodóvar. Deptos. de Protección de Cultivos, Agronomía y Suelos e Ingeniería Agrícola, Estación Experimental Agrícola, Universidad de Puerto Rico, Mayaguez, P. R. 00709.

En la Subestación Experimental de Lajas, en la región suroeste, semi-árida y con riego, se sembró un experimento replicado de 17 variedades de caña de azúcar y 3 testigos con el fin de evaluar su productividad y su resistencia al carbón (*Ustilago scitaminae*) y a la roya (*Puccinia melanocephala*) en las etapas de plantilla y retoños. Todas las variedades nuevas mostraron resistencia a estas enfermedades, excepto los testigos susceptibles que se usaron en el experimento. La incidencia del carbón aumentó cuando los testigos se dejaron retoñar, mientras que la resistencia o susceptibilidad de las variedades a la roya se mantuvo inalterable durante los tres ciclos de siembra. El análisis de variancia combinado de dos años indicó que la producción de 5 variedades fue consistente y más alta que la de las demás variedades, incluyendo el testigo local PR 980, en las cosechas de plantilla y del primer retoño.

ALTERNARIA LEAF SPOT AND BLIGHT (*ALTERNARIA EUPHORBICOLA*) AND SCAB (*SPHACELOMA POINSETTIAE*), TWO TROPICAL DISEASES OF POINSETTIA. A. W. Engelhard, GCREC, Univ. of Fla., IFAS, 5007 60th St. East, Bradenton, FL 34203

Alternaria leaf spot and blight causes lesions on leaves, bracts, stems, veins and petioles. Lesions 1-2 mm diameter are visible 24 hr after inoculation. They continue to increase in size. Leaves become chlorotic and abscise as infection increases. Conidia 35-60 x 10-20 um are formed singly on conidiophores on lesions and on infected tissue on the ground. Scab causes circular, raised lesions to 8 mm in diameter on all aerial parts of the plant. Hyaline conidia 3.9-6.5 x 2.0-3.3 um are produced singly on short conidiophores on lesions year-round in Florida. Fawcetti type conidia were found in July, August and September. Disease control for both diseases is accomplished by removing infected tissue (including leaves on the ground) and severely infected plants. Excellent disease control and less spray residue is obtained with tank-mix combinations of benomyl plus either mancozeb, chlorothalonil or captan, each at one-half the full label rate, and by chlorothalonil, mancozeb and captan.

XANTHOMONAS GENES CONTROLLING HOST-SPECIES SPECIFICITY AND DISEASE PHENOTYPES. D.W. Gabriel, V.R. Waney, S. Swarup and M.T. Kingsley. Plant Pathology Dept., U. of Florida, Gainesville, FL 32611.

RFLP analyses of strains within the genus *Xanthomonas* reveal a clonal population structure. We hypothesize that the RFLP groups are formed because of highly selected, host-specific virulence (*hsv*) genes (unique to the species or pathovar) superimposed on general virulence (*vir* and/or *hrp*) genes (common to the genus). We obtained Tn5 mutants of *X. campestris* pv. *citrumelo* (leaf spot of citrus & common bean) and *X. c.* pv. *translucens* (blight of wheat, oats, barley, rye, triticale) affecting all hosts generally (*Vir*⁻) and affecting one or more hosts, but not all (*Hsv*⁻). DNA fragments that complement both *Vir*⁻ (including *hrp*-homologous fragments) and *Hsv*⁻ mutations were obtained. One DNA fragment from *X. citri* (citrus canker) appears essential for the canker phenotype; interestingly, transconjugants of several different pathovars of *X. campestris* carrying this clone induced cankers on citrus. Preliminary hybridization data indicate that some *hsv* genes may serve as species-, pathovar-, or disease-specific DNA probes for detection and identification purposes.

A SIMPLE METHOD TO DETERMINE CAPTAFOL RESIDUES IN WHEAT PLANTS (*TRITICUM AESTIVUM* L.) AND SOIL SAMPLES BY GAS CHROMATOGRAPHY. Garcia G., J.E. Institut fuer Pflanzmedizln, Universitaet Hohenheim, Stuttgart 70, West Germany. Current address: Universidad Estatal a Distancia (PEA)/Universidad de Costa Rica (SEP), 2050 San Jose, Costa Rica.

The extraction of captafol residues occurred only with the immersion of the samples into toluene with occasional rotatory movements during 1 h. An additional cleanup procedure was unnecessary. The gas chromatograph, equipped with an ECD (63-Ni, 8 mCi), was maintained at the following conditions: column, 0.95 m x 6.35 mm o.d. x 2 mm i.d. borosilicate glass column, packed with 2% OV-17 coated on 125-150 um Gas-Chrom-Q; gas flows, nitrogen carrier gas, 30 ml/min; temperatures, column, 215 °C; injection port, 220 °C; detector, 240 °C; recorder strip cart velocity, 0.5 cm/min. Retention time was 4.2 min. The standards were done on control samples basis, because captafol is better detected in it as on standards prepared in pure toluene. Recovery average was 83-101% with limit of sensitivity at 0.02 mg/kg.

ERWINIA HERBICOLA AND BACILLUS POLYMYXA: TWO BLOSSOM-RESIDENT BACTERIAL ANTAGONISTS OF THE PATHOGEN SCLEROTINIA SCLEROTIUM, CAUSE OF WHITE MOLD DISEASE OF BEAN. G. Godoy, J.R. Steadman and G. Yuen, University of Nebraska, Plant Path., Lincoln, NE 68583-0722.

Bacteria isolated from bean blossoms collected in western Nebraska were screened *in vitro* against *Sclerotinia sclerotiorum*. Two strains, identified by substrate utilization and fatty acid profiles as *Erwinia herbicola* and *Bacillus polymyxa*, inhibited mycelial growth on nutrient media. Culture filtrates from *B. polymyxa* also inhibited ascospore germination. Tests *in vitro* and in growth chambers indicated that pre-treatment of bean blossoms with these strains prevented ascospore germination, growth of mycelia and thus infection of stems and pods of bean plants. The potential of *B. polymyxa* and *E. herbicola* to control *S. sclerotiorum* in the field is being investigated.

PROTECTION OF BEAN PODS AGAINST ANTHRACNOSE BY INDUCED RESISTANCE. Birmania Heredia, Alejandro González y Eva Soriano. Instituto de Investigaciones Químico Biológicas. UMSNH.A.P. 50-E. Morelia, México.

Localized as well as systemic resistance was induced in bean (*Phaseolus vulgaris* cv. Flor de mayo) plants. Localized resistance was associated with phytoalexin formation after injection with *Phytophthora boehmeriae*, a non pathogenic fungus of bean. Phaseolin levels were determined in 7 d-old plants and challenge infection was carried out with the kappa race of *Colletotrichum lindemuthianum*. *P. boehmeriae* acted effectively stimulating phytoalexin accumulation and induced resistance was observed at 24h-incubation increasing with time up to 86% protection at 96h when all controls had collapsed. Systemic protection of bean pods after two boosting-treatments was also achieved.

MARCHITEZ BACTERIAL DE LA HABICHUELA CAUSADA POR PSEUDOMONAS SOLANACEARUM EN COSTA RICA. José M. Jiménez, Elkin Bustamante. Proyecto MIP/CATIE, apartado 7170 Turrialba, Costa Rica.

A fines de 1989 se observó una marchitez bacterial severa en habichuela o vainica (*Phaseolus vulgaris*) en la Finca Experimental La Montaña del CATIE, ubicada en Turrialba, Costa Rica. Se determinó una incidencia de un 25% en el cv. "Extender". El patógeno fue caracterizado como *Pseudomonas solanacearum*.

La patogenicidad de aislamientos provenientes de tomate y habichuela fue evaluada en invernadero mediante punción en la segunda axila superior, colocando luego una gota de suspensión bacterial a 10^8 UCB/ml. Los aislamientos fueron patógenos en tres cultivares de habichuelas ("Strike", "Provider", "Extender") y también en tomate (cv. "Tropic"). Adicionalmente se inocularon cinco cultivares de frijol ("lea-Pijao", "Blanco", "Talamanca", "Mexico 80", y "Negro Huasteco"), encontrándose que los mismos son tolerantes a la bacteria. Al contrario de la habichuela no fue posible aislar la bacteria de los diferentes cultivares de frijol inoculados, observándose solo una respuesta de hipersensibilidad en la zona de inoculación.

Black spot disease of pineapple, L. J. Liu and J. García-Tudurí, Agricultural Experiment Station, University of Puerto Rico, Río Piedras, P. R. 00928

Black spot disease, an internal fruit discoloration, has affected considerably the quality of pineapple fruit PR 1-67, a local variety which can sustain a profitable industry. The causal agent of the disease has been isolated and identified as *Penicillium purpurogenum*. Heavier fruits seemed to have a higher number of spots. The majority of the spots occurred in the upper portion of the fruits, i.e., the area below the crown. A pH range from 3 to 7 favors mycelial growth of the fungus, but at pH 10.9, growth is drastically inhibited. The number and size of black spots per fruit increases significantly when pineapples were subjected to temperatures higher than 46° F. Black spot per fruit was significantly reduced when PR 1-67 was sprayed with benomyl at 2 lbs per 100 gal. of water, benzimidazole at 16 oz per 100 gal. of water and carbendazim at 2 lbs per 100 gal. of water.

Pathological and management factors possibly contributing to "plantain decline" in Puerto Rico. L. J. Liu, M. Santiago, D. Ramos, A. C. Monllor, W. Figueroa, E. Rosa-Márquez, and E. Lizardi, Agri. Exp. Station, Univ. P.R., Río Piedras, P. R. 00928.

Plantain decline, a drastic reduction in yield in ratoon crop, is a serious problem for growers in Puerto Rico. Composite soil and root samples were collected before planting and at 3-6 months interval after planting from each plot of 4 replicated field experiments to determine nematodes and fungi which might contribute to the decline. Results obtained indicate that *Radopholus similis*, *Erwinia aroidae* and *Fusarium oxysporum* which had not been found in the previous year were isolated in low population from roots, and pseudostems one year after planting. A total of 14 treatments were included in the study. Results obtained from the plant crop harvested recently indicate that application of nematicide at 85 g/plant/year, every 3 months significantly increased number of fruit at 1% level over the untreated control. Planting distance 6' x 9' seems to have a higher yield than that of 6' x 6' in all treatments.

MOLLICUTE DISEASES IN THE TROPICS. Karl Maramorosch, Rutgers University, New Brunswick, NJ 08903

Many of the 300 known plant mollicute diseases affect tropical crops. Gene cloning and hybridoma has provided sensitive probes for assaying MLO diseases. Losses in the tropics range from barely perceptible to catastrophic, depending on the pathogens, plant susceptibility, vector population, competence and other factors, some of which can be manipulated to provide various degrees of control. Chemotherapy has been costly and disappointing. Heat treatment, surgery and screens to avoid vector transmission have been used in but a few instances. Breeding for resistance to mollicutes and to vectors is the current control choice. Cross-protection might be improved for selected control. New strategies will employ biotechnology to control vectors and to induce plant resistance.

A DISEASE OF PASSIONFRUIT (*Passiflora edulis*) IN PUERTO RICO POSSIBLY CAUSED BY AN ISOLATE OF WATERMELON MOSAIC VIRUS 2. C.L. Niblett¹, A.C. Monllor², R. Providenti³, P.E. Still¹, J. Escudero², J. Bird², and K. Gough⁴. ¹Plant Pathology Dept., Univ. of Florida, Gainesville, FL 32611, ²Dept. of Crop Protection, Univ. of Puerto Rico, Río Piedras, PR 00928, ³Dept. of Plant Pathology, Cornell Univ., Geneva, NY 14456 and ⁴Division of Biotechnology, CSIRO, Melbourne, Australia.

Passionfruit production in Puerto Rico is reduced severely by a virus disease. The causal virus, tentatively identified as Puerto Rican passionfruit

virus (PRPV), was transmitted mechanically and by four aphid species to several herbaceous hosts. PRPV was designated a potyvirus based on its cytoplasmic inclusion bodies, particle length and serological reactivity. It was distinguished from both passionfruit woodiness and mottle viruses from Taiwan (Bird, et al., In Press). New data on host reactions (inheritance of resistance in beans), serological reactivity and the capsid protein (Mr=32kd) indicate that PRPV may be an isolate of watermelon mosaic virus 2 (WMV-2). Comparisons are in progress with isolates of WMV-2 and viruses of *Passiflora* occurring in Australia.

IDENTIFICATION OF THE COAT PROTEIN GENE OF CITRUS TRISTEZA VIRUS BY DENATURATION AND TRANSLATION OF DOUBLE-STRANDED RNAs. C.L. Niblett¹, D.M. Stark², R.F. Lee³ and R.N. Beachy², Plant Pathology Department, University of Florida, Gainesville, FL 32611, ²Department of Biology, Washington University, St. Louis, MO 63130 and ³Citrus Research and Education Center, Lake Alfred, FL 33850.

Double-stranded (ds) RNAs (replicative forms) of citrus tristeza virus (CTV) were purified by phenol extraction, LiCl fractionation and CF-11 cellulose chromatography. The ds RNA products were evaluated by polyacrylamide gel electrophoresis (PAGE) and fractionated by agarose gel electrophoresis. Individual or unfractionated ds RNAs were denatured in 2.5 mM methylmercuric hydroxide and translated in the wheat germ *in vitro* translation system. Translation products were analyzed by PAGE after reaction with CTV antiserum. A single product migrating at 25-28 kilodaltons was immunoprecipitated following translation of a 2.1 kilobase ds RNA, but not from larger or unfractionated ds RNAs. Therefore a copy of the CTV coat protein gene is encoded on the 2.1 kilobase ds RNA.

CUCUMBER MOSAIC VIRUS SEROTYPES IN BANANAS AND PLANTAINS IN PUERTO RICO AND COSTA RICA. C.L. Niblett¹, P.E. Still¹, J. Bird², A. Monllor², J. Escudero² and R. Lastra³. ¹Plant Pathology Department, University of Florida, Gainesville, FL 32611 ²Crop Protection Department, University of Puerto Rico, Río Piedras, PR 00928 and ³CATIE, Turrialba, Costa Rica.

A survey was made in Puerto Rico for cucumber mosaic virus (CMV) infecting bananas, plantains and associated weeds. CMV was detected by ELISA and classified to serotype with CMV-Cr and CMV-Vi antibodies (AGDIA, Elkhart, IN 46514). CMV was detected in symptomatic leaves of commercially grown bananas and plantains, in *Commelina diffusa* (a weed common under bananas and plantains) and in *Musa velutina* (an ornamental banana). Field incidence of CMV was always associated with infected *Commelina*. At least two CMV serotypes were found in bananas and plantains in Puerto Rico, with CMV-Vi most prevalent. A banana sample from Costa Rica contained the CMV-Cr serotype. In western blot analysis the capsid protein of both serotypes migrated at Mr=24,000.

EFFECT OF INOCULATION OF THREE ISOLATES OF *Phytophthora palmivora* ON CACAO CULTIVARS. W. Phillips and J.J. Galindo, CATIE, Turrialba, Costa Rica.

At Turrialba (602 masl, 22 C, 2600 mm rainfall) were tested isolates (I) 964, 188 and 4088 of *P. palmivora* on 22 cacao cultivars. Five-month-old pods were inoculated with a suspension 150,000 zoospores/ml adsorbed on 0.5 cm diam filter paper disks, which were placed on two opposite sites at the middle of the pod. Fruits were covered with plastic bags containing wet paper towels, which were removed from the bags 24 hr after inoculation. Twelve cultivar were resistant to I-964 (diam of lesion (dl) 2.1 cm) and 8 were moderately resistant (MR) (dl 2.1-4.0 cm). Incidence was 99% and the interaction in severity between isolate x cultivar was highly significant. Cultivars resistant to I-964 were MR to I-188 and I-4088. Cultivars MR to I-964 were also MR to I-188 and I-4088. Cultivars 'TSHN-812', 'EET-59', 'Pound-7' and 'CC-214' were resistant to all isolates.

EFFECT OF *Phytophthora palmivora* ON THREE CACAO CULTIVARS AND THEIR CROSSES. W. Phillips and J.J. Galindo, CATIE, Turrialba, Costa Rica.

The effect of *P. palmivora* was tested at Turrialba (602 masl, 22°C, 2600 mm rainfall) on the cacao cvs 'Pound-7', 'UF-613', 'UF-676' and crosses among them. Five-month-old pods were inoculated with 150,000 zoospores/ml, from a mixture of two isolates with high differential pathogenicity. Inoculum was adsorbed on 5 mm diam filter paper disks, which were placed on two opposite sites at the middle of the pod. Incidence was 99%. The diam of lesion (dl) showed cvs 'Pound-7' and 'UF-613' were resistant (R) (dl 2.1 cm) and 'UF-676' moderately susceptible (MS) (dl 4.1-6.0 cm). Crosses between resistant parents showed lower severity ('UF-613' x 'Pound-7' = 2.2 cm y 'Pound-7' x 'UF-613' = 2.7 cm). The other crosses showed a dl of 2.8-3.3 cm. From 53 trees evaluated 41% were R, 34% MR and 25% moderately susceptible. There were no susceptible trees (dl 6.1 cm). Resistant trees originated 59, 23 and 18% from the crosses 'UF-613' x 'Pound-7', 'Pound-7' x 'UF-676' and 'UF-613' x 'UF-676', respectively.

SPECIES OF *PHYTHIUM* AS PATHOGENS OF PERENNIAL, WOODY FRUIT CROPS IN SOUTH FLORIDA. R.C. Ploetz, University of Florida, IFAS, TREC, 18905 SW 280th Street, Homestead 33031.

Several important woody fruit crops in South Florida, including atemoya (*Annona squamosa* X *cerimola*), carambola (*Averrhoa carambola*), and mamey sapote (*Calocarpum sapota*), succumb periodically to declines which are associated with flooding or over-watering. Trees may have sparse canopies and may wilt and defoliate suddenly; cortical tissue and first- and second-order roots of affected plants are invariably necrotic. Isolations from roots of the above crops on media which are selective for pythiaceae fungi have not yielded species of *Phytophthora*, but *Pythium splendens* and a nonidentified species of *Pythium* have been frequently recovered. In preliminary greenhouse studies on seedling mamey sapote, each of the species caused root necrosis and was recovered from symptomatic tissue. However, only isolates of *P. splendens* consistently reproduced the above disease syndrome. Increases in root necrosis and reductions in root and shoot biomass were observed in inoculated, but not in noninoculated plants, which were flooded for one week.

YIELD LOSS INCITED BY *PUCCINIA MELANOCEPHALA* ON A HIGHLY SUSCEPTIBLE SUGARCANE CULTIVAR IN FLORIDA. R. N. Raid, D. L. Anderson and F. J. Coale. Univ. of Florida, IFAS, Everglades Research and Education Center, Belle Glade, FL 33430.

Comparisons of historical data indicate yield potentials of cultivars CP72-1210 and CP78-1247 to be nearly equal in the absence of sugarcane rust. CP78-1247 demonstrated a significant increase in rust susceptibility during the spring of 1988. Mean rust severities from 5 sites located throughout the Everglades Agricultural Area (EAA) during Spring 1988 were 51% and 13% for CP78-1247 and CP72-1210, respectively. During Fall 1988, yield data was collected from 13 EAA locations at which these cultivars were planted in the same or adjacent fields. Cane per unit area and total sugar per unit area were 40.3% and 39.3% lower for CP78-1247 than for CP72-1210, respectively. The severe reaction of CP78-1247 to rust has effectively halted the expansion of this cultivar, with a considerable amount of the CP78-1247 plant cane acreage being removed from production after only 1 harvest.

INFLUENCE OF CULTIVAR AND CALCIUM SILICATE SLAG ON RUST SEVERITY AND YIELD OF SUGARCANE. R. N. Raid, and D. L. Anderson, Univ. of Florida, Everglades Research and Education Center, Belle Glade, FL 33430 and M. F. Ulloa, New Hope Sugar Cooperative, Pahokee, FL 33476.

Calcium silicate slag has been demonstrated to reduce foliar disease severities and to increase yield of Histosol-grown rice in Florida. Sugarcane rust severity was assessed on five cane cultivars grown with and without slag (6.7 mt/ha) in a replicated field test in the Everglades Agricultural Area. Disease severity and yield were both significantly influenced ($P < 0.001$) by cultivar differences. Rust severity was not influenced by slag amendments ($P = 0.05$), however, rust severity on 4 of 5 cultivars was relatively light. Cane and sugar yield per unit area were significantly increased by slag application, with increases in sugar yields ranging from 12 to 28%. Significant cultivar X silicate slag interactions were not detected. Results suggest that yield responses of sugarcane to slag amendments may be attributable to reasons other than increased resistance to sugarcane rust.

CULTURAL CHARACTERISTICS AND PATHOGENICITY OF *FUSARIUM OXYSPORUM* ISOLATED FROM GUINEA YAMS, *DIOSCOREA ROTUNDATA*, IN PUERTO RICO. D. Ramos, J. Mignucci and A. González. Agricultural Experiment Station, P. O. Box 21360, Río Piedras, PR 00928.

Fusarium oxysporum causes wilt, basal canker and root rot disease of guinea yam, *Dioscorea rotundata*, in Puerto Rico. Three isolates of *F. oxysporum* were obtained from stem, base and root of guinea yam. These isolates were differentiated based on pigmentation and colony characteristic when grown on PDA. When field plants were inoculated, the damages caused by the three isolates appeared to be related to their origin. The vascular isolate causes greatest damage in the stem vascular system, the root isolate in the roots and the basal isolate on the base of the plants. This suggests that the three isolates of *F. oxysporum* might be distinct strains differing in colony vigor, pigmentation, and their preference for the particular tissues. Currently the basal isolate is the one that has caused the most damage on yams grown at the Corozal Substation.

COFFEE LEAF RUST IN PUERTO RICO

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Since February 1989, coffee leaf rust (*Hemileia vastatrix*) was detected in Puerto Rico. The disease was first observed in two private farms at the municipalities of Las Marias and Mayagüez. Three months later foci were reported from 10 different locations and a year after the pathogen had spread over the coffee region of the Island. Size of foci and severity of the attack vary among regions and areas within the farm. Attacks by *H. vastatrix* have been observed in *Coffea arabica*, *C. canephora*, and *C. liberica*. Thus far, race II is the only race reported to be present in the Island. Control of the disease is based on foliar applications of triadimefon and copper hydroxide. Timing for sprays is based on the rainfall pattern. Recommendations for old plantations include severe pruning followed by protection of new growth with fungicides.

In vitro propagation of disease-free bromelia, poinsettia and dracaena in Puerto Rico, E. Rosa-Márquez, E. Lizardi and L. J. Liu, Department of Crop Protection, Agricultural Experiment Station, University of Puerto Rico, Río Piedras, Puerto Rico 00928.

The ornamental plant industry has become increasingly important in Puerto Rico. Major factors limiting production and export of bromelia, poinsettia and dracaena are diseases, nematodes and insects. Some 3,828 plantlets of bromelia, poinsettia and dracaena were propagated in vitro employing a modified Murashige and Skoog medium (MS). Both bromelia and poinsettia required small amounts of hormones for regeneration and growth while dracaena required moderate amounts. One half strength of MS promoted rooting of poinsettia and Kinetin at 4 mg/l in the modified MS medium stimulated shoot differentiation. MS + Kinetin at a rate of 1 mg/l + coconut water (15%) promoted callus and shoot differentiation in dracaena and MS + 1 mg/l NAA promoted root formation.

AVANCES EN LA IDENTIFICACION DE LA MICROFLORA EN SEMILLAS DE HABICHUELA (*PHASOLUS VULGARIS* L.) DE LA REPUBLICA DOMINICANA. Alfonsina Sánchez, P. R. Hepperly, R. Echávez-Badel y J. S. Beaver. Depto. de Protección de Cultivos, TARS (ARS-USDA), Depto. de Agronomía y Suelos, Universidad de Puerto Rico, Mayagüez, P.R. 00708

La semilla de habichuela utilizada para la siembra en la República Dominicana (RD) es de mala calidad debido a impurezas y patógenos, algunos de los cuales son trasmisibles por semillas. Se realizó un estudio en los laboratorios de Fitopatología del Recinto de Mayagüez y de la Estación Federal (TARS-USDA) con el fin de identificar y caracterizar los hongos presentes en las semillas procedente de la RD. Se utilizaron muestras de la Secretaría de Estado de Agricultura y de una compañía productora de semillas de este país. Se usó papel celuloso y placas petri con agar, papa y dextrosa. En ambos métodos se determinó el porcentaje de germinación y se identificaron los hongos siguientes: *Aspergillus niger*, *A. sydowii*, *A. flavus*, *A. ustus*, *A. humicola*, *Cladosporium* sp., *Mucor* sp., *Rhizopus* sp., *Penicillium* sp. y *Macrophoma phaseolina*.

EPIDEMIOLOGICAL STUDIES OF BLACK SIGATOKA ON PLANTAINS IN COSTA RICA. A.C. Tapia, J.J. Galindo and J.V. Escalant. CATIE, Turrialba, Costa Rica.

At "La Lola" (40 masl, 26.5°C, 3,700 mm annual rainfall) Prov. of Limón was studied the development of black Sigatoka caused by *Mycosphaerella fijiensis* on the cv 'False Horn' (AAB). Parameters evaluated were: periods of incubation (IP) and evolution of symptoms (EP); leaf emergence (LE), youngest leaf spotted (YLS), youngest leaf necrosed (YLN); number of leaves at harvest (LH), perithecia/mm² and yield. Incubation varied between 11-17 days, EP between 25-35 days and YLN between leaves 4-9, being all of them affected by rainfall and minimum temperature. The interaction among EP, YLN, LH and LE with the climatic factors mentioned were the main indicators for disease management.

PUDRICION SECA DE LA COL DE BRUSELAS. Omar Tortolero. C. Daboin y Adalberto Carrasco. UCLA. Escuela de Agronomía. Posgrado en Fitopatología. Núcleo Trujillo. Depto. de Ciencias Agrarias. ULA.

En los alrededores de Timotea y Lagunilla en los Estados Mérida y Trujillo respectivamente, se ha detectado una nueva y potencialmente seria enfermedad en plantaciones de Col de Bruselas (*Brassica oleracea* var *gemmifera*). La sintomatología de la misma consiste en manchas necróticas sobre hojas, tallos y repollitos con centro grisáceo y márgenes morados encima de las cuales se forman numerosos picnidios. Las observaciones al material infectado evidenciaron la presencia de pseudotecios negros inmersos en los tejidos y picnidios típicos de *Phoma*. De los aislamientos hechos en medios de cultivo (APD) se obtuvo el desarrollo de picnidios a los 7 días, así mismo como la formación de ascocarpos a los 24 días. El estado picnidial corresponde a *Phoma lingam* (Tode) Deam. Siendo *Leptosphaeria maculans* (Des) Cos & Not el correspondiente teleomorfo.

PHYLLACTINIA Y BACILLIOMYCES DOS ESTADOS SEXUALES DE OIDIOS PRESENTES EN VENEZUELA. Omar Tortolero y Richard Honlin. Posgrado en Fitopatología UCLA. Apartado 400. Barquisimeto, Venezuela. Plant Pathology Department. UGA Athens, Ga. U.S.A.

En plantas de roble (*Platymiconium diodolphum*) y de algodón silvestre (*Gossypium purpurum*) se presentan ataques de *Phyllactinia* sp. y de *Brasiliomyces malachrae* (Seaver) Boesewinkel respectivamente. Ambos hongos constituyen un hallazgo poco común en regiones tropicales donde la formación de cleistocarpos no ocurre con frecuencia. La formación de cleistotecios de *Phyllactinia* se inicia en diciembre de cada año cuando las temperaturas alcanzan alrededor de 22°C. Estructuras amarillas, anaranjadas, marrones y negras se observan en el envés de las hojas entremezcladas con abundante micelio, conidióforos y conidias de *Ovalaropsis* sp. Hasta el presente no se han sido observadas ascas ni ascosporas maduras. *Brasiliomyces* forma colonias blancas sobre las superficies de las hojas, observándose cleistotecios blancos sobre un micelio blanco superficial: cada cleistotecio tiene ascas en forma de saco 3-5 ascosporas ovales, comúnmente 5. El estado anamorfo reportado para el género como *oidium*, no ha sido observado hasta ahora.

BENEFICIAL FUNGI-CORN RELATIONSHIP AND ITS APPLICATION TO THE IMPROVEMENT OF CORN-BEAN INTERCROPPING IN THE TROPICS. Nader G. Vakili, USDA/Agric. Res. Service and Dept. of Plant Pathology, Iowa State University, Ames, IA 50011.

Recent studies indicate that corn (*Zea mays*) genotypes are hyposusceptible to and harbor in their tissues beneficial fungi such as entomopathogen *Beauveria bassiana* and mycopathogens *Gliocladium roseum*, *Gonatobotrys simplex*, *Sphaeronaemella helvella*, and *Trichoderma viride*. The result of this relationship is a decrease in pest damage and increase in grain yield. Other studies of corn-bean (*Phaseolus vulgaris*) dualculture in the tropics indicate that pest damage to both crops is lower than in monoculture of either crop. By breeding and selecting corn for hyposusceptibility to beneficial fungi, genotypes could be developed that, in combination with these fungi, would reduce damage by pests and increase yield in both crops. This method of biocontrol would enhance the socio-agricultural practices which have been used successfully in tropical America for centuries.

CONTROL DEL NEMATODO NODULADOR (*MELOIDOGYNE* SPP.) MEDIANTE EL USO DE LA BACTERIA PARASITICA *PASTEURIA PENETRANS* (THORNE) SAVRE Y STARR.

Roberto Vargas y Nelía Acosta, Asistente de Investigaciones y Nematóloga, respectivamente, Departamento de Protección de Cultivos, Recinto de Mayagüez, Mayagüez, P.R. 00708

Se establecieron tres experimentos de invernadero en el Recinto Universitario de Mayagüez para estudiar el potencial de la bacteria *P. penetrans* (población A de Australia) como

biocontrolador del nemátodo nodulador *Meloidogyne incognita* en plantas de tomate. Los resultados revelaron que plantas infectadas por el nemátodo e inoculadas con la bacteria presentaron un índice de nodulación significativamente menor y un menor número de larvas y huevos de *Meloidogyne* spp. que aquellas plantas infectadas sólo con el nemátodo. Se observó además una reducción en la movilidad de larvas con siete o más esporas adheridas.

POLYPEPTIDES CHANGES DETECTED IN COMPATIBLE AND INCOMPATIBLE INTERACTIONS OF THE TEPARY BEAN UPON INOCULATION WITH DIFFERENT BACTERIA. M. Zapata and A.K. Vidaver. Crop Protection Dept., Univ. of Puerto Rico, Mayaguez, PR 00708 and Plant Pathology Dept., Univ. of Nebraska, Lincoln, NE 68583.

Early stages of pathogenesis were examined by analyzing exudates that result from different host-parasite combinations at different periods after inoculation. Polypeptides changes were detected during the interaction of the tepary bean, *Phaseolus acutifolius* with *Xanthomonas campestris* pv. *phaseoli* (Xcp), *Pseudomonas syringae* pv. *savastanoi* and *Escherichia coli* using polyacrylamide gel electrophoresis. Polypeptides differences were also found in the common bean inoculated with Xcp strains differing in the ability to produce indole-3-acetic acid.

A SEED-BORN POTYVIRUS OF *VOANDZEIA SUBTERRANEA* IDENTIFIED AS A STRAIN OF PEANUT MOTTLE VIRUS. F.W. Zettler*, R.H. Li*, C.A. Baker*, and G.I. Mink**, *Plant Pathology Dept., University of Florida, Gainesville 32611. **Plant Pathology Dept., Washington State Univ., Prosser 99350.

A potyvirus (VSV) of *V. subterranea* (Li, et al., Phytopathology 80:436) was identified as peanut mottle virus (PMoV). In SDS immunodiffusion tests, homologous precipitin lines of VSV fused without spur formation with heterologous lines of PMoV. In reciprocal DAS-ELISA and plate-trapped indirect ELISA (I-ELISA) tests, A₄₀₅ values for homologous and heterologous antigens were similar, regardless whether VSV or PMoV antiserum was used. "Potyvirus group" monoclonal antiserum (Agdia, Inc., Elkhart, IN 46514) did not react positively in I-ELISA tests with VSV or PMoV, but did react with dasheen mosaic and watermelon mosaic 2 viruses. VSV systemically infected 3 *Arachis hypogaea*, 7 *Phaseolus vulgaris* (bean) and 8 *Pisum sativum* cultivars. VSV induced local lesions (0.4-0.8 mm diam) in 'Topcrop' bean like those described for M-2 strains of PMoV.

A SEED-BORNE POTYVIRUS OF *VOANDZEIA SUBTERRANEA* IDENTIFIED AS A STRAIN OF PEANUT MOTTLE VIRUS. F.W. Zettler, R.H. Li and M.S. Elliott. Plant Pathology Department, University of Florida, Gainesville 32611.

A virus infecting *V. subterranea* (VSV) (Li et al. 1990. Phytopathology 80:in press) was similar to peanut mottle virus (PMoV) in serological tests and host-range studies. In SDS immunodiffusion tests, homologous precipitin lines of VSV fused without spur formation with precipitin lines of PMoV. In reciprocal DAS-ELISA tests, A₄₀₅ values for homologous and heterologous antigens were similar, regardless of whether VSV or PMoV antiserum was used. VSV systemically infected 3 *Arachis hypogaea* and 8 *Pisum sativum* cultivars after manual inoculation. Fifteen of 18 cultivars of bean (*Phaseolus vulgaris*) reacted similarly when inoculated with either VSV or a mild strain of PMoV supplied by J.W. Demski (Univ. Georgia, Griffin 30223). VSV induced local lesions (ca. 1.3 mm²) in 'Topcrop' bean. The symptoms in *A. hypogaea* and 'Topcrop' bean were like those described for the M-2 strain of PMoV (Paguio and Kuhn, 1973. Phytopathology 63:976).